

ABSTRACT OF THE DISCLOSURE

Embodiments of the invention provide methods and apparatus to process substrates such as flat panel displays, solar panels, etc. In one aspect, the apparatus provides external toroidal plasma generation to perform substrate processes such as deposition and etching of rectangular-shaped substrates. In another aspect, the apparatus provides external toroidal plasma generation to perform chamber cleaning by flowing plasma of a process gas such as argon through a toroidal plasma current path that includes a processing region to be cleaned, introducing a cleaning gas such as fluorine into the processing region from a showerhead apparatus, and cleaning the processing region. In still another aspect, a toroidal plasma loop is shaped by a plasma shaping apparatus to direct the plasma across a processing region within the apparatus to improve process uniformity.

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